II.—CEREBRAL LOCALIZATIONS.

I. THE LOCALIZATION OF CEREBRAL DISEASE. Gulstonian Lectures for 1878. By David Ferrier, M. D., F. R. C. S. New York: G. P. Putnam's Sons, 1879.

II. CHARCOT ET PITRES: NOUVELLE CONTRIBUTION À L' ÉTUDE DES LOCALISATIONS MOTRICES DANS L' ÉCORCE DES HÉMISPHÈRES DU CERVEAU. (*Motor localizations in the cerebral cortex.*) *Revue Mensuelle*, Nov., 1878, and Feb., 1879.

III. LECTURES ON THE LOCALIZATION OF SPINAL AND CEREBRAL DISEASES. By E. C. Seguin, M. D. Reprinted from *The Medical Record* for distribution to the author's friends. New York, 1878.

I. As the author states in a short preface, the present work is to supplement his volume on "the functions of the brain." The experimental results developed on animals in the former essay are to be applied in human pathology, and compared with the similar experiments furnished by chance in cerebral lesions. In order to establish the validity of inferences deduced from the observation of brain lesions in well observed cases, Ferrier puts into the proper light the arguments of the opponents of cerebral localization, especially Brown-Sequard. A certain lesion must be regarded as the cause of symptoms observed during life, if the symptoms are referable to no other cause, and if the simultaneous occurrence of lesion and symptom is sufficiently frequent to exclude mere coincidence. The lesion may, however, be the indirect cause of the symptoms, a relationship by no means rare in the case of the brain. But all faith in such a relationship would be completely overthrown by a single negative case; the description of such a case, however, should be received with great caution.

The functions of the brain are both physiological and psychological. The latter have usually been supposed to be diffusely distributed, and not localized in any one part. Extensive lesions in one hemisphere may be latent as regards mental symptoms; even a whole hemisphere may be disorganized with a like negative result. But, Ferrier demands, have the same parts in both hemispheres ever been destroyed without producing mental disturbance? Unless such an evidence is adduced, we can only conclude that one hemisphere is sufficient for mental action. Ferrier doubts even whether one-sided lesions are without effect on the mental state, a doubt fully justified by the impossibility of accurately gauging the mental condition, and even the usual indifference in this matter. If slight mental disturbances are recognized but with difficulty in man, how much more difficult must it be in the case of the lower animals? Ferrier warns also

—and with justice—against the readiness of some authors to apply, without qualification, the results of brain lesions in lower animals to the brain of man, when anatomy alone points out quantitative differences of no slight import.

The existence of motor centres in the cortex is defended by Ferrier in a very judicious manner. A false importance has been attached by many to the fact that movements can be produced by electric irritation, even after removal of the grey substance of the cortex. But is not every motor nerve excitable as well as the centre from which it originates? That, however, the motor impulse is started primarily in the grey cortex and not in the subjacent white fibres, is sufficiently proven by the greater strength of current necessary in order to stimulate directly the exposed fibres. A conclusive evidence is also furnished by the experiments of Franck and Pitres, who found the interval of time between the stimulus and the movement notably lessened by removal of the grey substance.

Although there seems to be an apparent want of harmony in the results of localized destruction of the cortex in different animals, the entire results come readily under one principle, if we remember the relative development of the cortex and the lower centres in the different species. The principle could not be better expressed, than in Ferrier's words: "In accordance with this generalization, I ventured to predict that, even in the case of animals whose motor powers did not seem permanently to suffer from destructive lesions of the cortical motor centres, those movements must be paralyzed which involve conscious discrimination, and were not automatically organized. This has been amply verified by Goltz's experiments on dogs. Goltz found that, though a dog's paw is not permanently paralyzed as an organ of locomotion by destruction of the cortex, *yet it remains permanently paralyzed for all those actions in which it is employed as a hand.*"

Entering now upon his special subject, Ferrier quotes a number of cases of injury to, and lesions in, the frontal lobes. In these cases, collected from different sources, no motor or sensory symptom can be legitimately traced to a lesion of the frontal lobes; psychic troubles are, however, mentioned in some. Mental disturbances Ferrier would expect in every case, strictly examined, a result which would harmonize with his experiments on the præ-frontal lobes of monkeys. These animals, "while not actually deprived of intelligence, had lost, to all appearance, the faculty of attentive and intelligent observation."

Hereupon, lesions of the motor regions are discussed, under the headings of hemiplegias and monoplegias, and on the other hand, of general unilateral spasms and (limited) monospasm. An unbiased attempt is made to classify the lesions observed in the cases topographically, and the result agrees very well with the author's experiments on monkeys. We cannot here follow the author in his details.

Less preciseness is to be found in the chapter on lesions of the sensory region. Anatomically, the occipital and temporal lobes are connected with sensory strands. The experiments of Veyssière (repeated by other French observers) show the functions of the strands, their section at the level of the posterior third of the internal capsule producing hemianæsthesia of the opposite side of the body. Lesions situated in this part of the human brain have the same result.

Ferrier's experiments on monkeys lead him to regard the occipital lobes as the centres for visual sensations. He admits, however, the precarious nature of this view. A number of cases, both of slow lesions and of sudden accidents of these lobes in man were wholly negative in symptoms. Munk's positive statements, however, as regards the connection of the eyes with the occipital lobes, are dismissed in a somewhat unsatisfactory manner. Recent clinical observations, such as those of Baumgarten and Huguenin, point decidedly towards the existence of visual centres in the occipital lobe.

The parieto-temporal region is considered by Ferrier to contain the centres of the senses. His irritation experiments, however, on monkeys afford but a very feeble evidence for this view. But it must be admitted that such uncertainty is unavoidable in irritations of sensory parts in animals—especially nerves of special sense. On the other hand, the experimental destruction of these centres is followed by symptoms, the interpretation of which as paralyses of special senses seems natural. Strangely, however, a number of clinical cases from high authorities were absolutely latent as regards sensory symptoms connected with lesions of the parieto-temporal region. No bilateral lesions, however, have been reported without sufficient mental disturbance to render sensory examinations valueless. To overcome the apparent discrepancy between the physiological and pathological observations, Ferrier cuts, instead of untying, the Gordian knot, by claiming that such cases have been *loosely observed.* Although this charge is not without some foundation, it does not throw any further light upon the subject. Our entire knowledge of sensory centres in the cortex is as yet very fragmentary, and if Ferrier undertakes the rôle of pioneer in this field, we must permit him to take some stand-point to start from. Aside from the chapter on sensory centres, the author cannot be accused of theorizing without proper basis. On the contrary, the entire work is a very judicious and critical review of facts.

II. Charcot and Pitres published about a year ago a long series of articles (also in the *Revue Mensuelle*) on the subject of cerebral localization. Their present memoir is but an addition to the previous one. It consists almost wholly of reports of cases, many of which are original. Apparently adverse observations are impartially criticized, while the others, selected with due care, in order to exclude complications, are analyzed. The value of the memoir is, perhaps, best expressed in the author's own conclusions.

There exist in the cerebral cortex regions which possess no motor functions, and can be destroyed without motor impairment. These regions comprise the occipital, the sphenoidal (temporal), the anterior part of the frontal, the orbital and the parietal lobe (excepting, perhaps, the foot of the latter), also the lobus quadratus and cuneatus.

The centre for the movements of the tongue is found at the foot of the third (inferior) frontal convolution, and on the contiguous portion of the ascending frontal convolution.

The centre for the movements of the inferior part of the face occupies the lower part of the two ascending (frontal and parietal) convolutions.

The centre for isolated movements of the superior extremity exists in the middle third of the ascending frontal convolution.

The combined centre for movements of the upper and lower extremity (of the opposite side) is spread over the paracentral lobule, the superior third of the ascending frontal and the upper two-thirds of the ascending parietal convolution.

III. In a series of eight lectures delivered at the College of Physicians and Surgeons, Dr. Seguin attempts to facilitate localized diagnoses in nervous diseases, by giving a short, but comprehensive, sketch of the physiological anatomy of the cord and brain, including the most recent researches. As far as known, the functional importance of the different strands is likewise stated; and thus there is developed a schema, from which lesions can be readily localized. As such, it has some of the faults, but also all of the merits, of a schema. It can certainly serve as an excellent guide in the labyrinthine arrangement of the nervous system. The diagrams that are given are very useful in illustrating the text, though that is itself sufficiently clear, and the critical remarks of the author are, throughout, judicious. It is to be regretted that so useful and convenient a condensed statement of its subject is not in a form more generally accessible to the medical student. H. G.